logy in Manchester University, and director of the public health laboratories of the university, which occurred on November 13 last, at the age of sixty-six years.

WE learn with regret of the death, which occurred recently, of TADEUSZ GODLEWSKI, professor of physics and formerly rector of the Technical High School, Lemberg (Lwów), Poland.

IT is announced that MR. JOHN MACALISTER DODDS, fellow and formerly tutor of Peterhouse, Cambridge, died on November 13 at the age of sixty-three years.

WE regret to announce the death on Sunday, November 13, at the age of eighty-one years, of SIR C. DOUGLAS FOX, past-president of the Institution of Civil Engineers.

Notes.

H.M. THE KING has approved of the following awards this year by the president and council of the Royal Society: A Royal medal to Sir Frank Dyson, Astronomer Royal, for his researches on the distribution and movement of the stars; and a Royal medal to Dr. F. F. Blackman, for his researches on the gaseous exchange in plants and on the operation of limiting factors. The following awards have also been made by the president and council: The Copley medal to Sir Joseph Larmor, for his researches in mathematical physics; the Davy medal to Prof. Philippe A. Guye, for his researches in physical chemistry; and the Hughes medal to Prof. Niels Bohr, for his researches in theoretical physics.

THE memorial tablet to the late Lord Rayleigh executed by Mr. Derwent Wood, R.A., is now complete, and is being placed in the position selected for it in the north transept of Westminster Abbey, between the memorials to Sir Humphrey Davy and Dr. Thomas Young. The Dean of Westminster has arranged for the unveiling ceremony to be held on Wednesday, November 30, the anniversary day of the Royal Society, at 2 p.m. Sir Joseph Thomson, as chairman of the memorial committee, will represent the University of Cambridge and the Royal Society.

THE Stockholm correspondent of the *Morning Post* announces that the Nobel prize for chemistry for 1920 has been awarded to Prof. Walter Nernst, of Berlin University. The prizes for chemistry and physics for 1921 have been reserved for next year.

IN a discussion in the House of Lords on November 10 the Marquess of Crewe voiced the complaint of teachers and students of science that the Safeguarding of Industries Act and the German Reparation (Recovery) Act had had the effect of hampering research and the teaching of science. The former act imposed high penalties on professors and education authorities generally who were forced to purchase materials abroad—materials which would never be produced in this country; the latter caused considerable delay in getting German books. It was a foolish policy, he urged, to discourage that research upon which the prosperity of the country so largely depended for the sake of the small amount of revenue extracted from underpaid professors and underfed students. Viscount Haldane suggested that a licence should be given by the Research Department or the Board of Education for getting the things required for research. The excellence of German scientific goods was due to the workman's spirit and tradition, and British research could not wait while British workmen were imbued with these attributes. In reply Viscount Peel stated that the Government were prepared neither to issue licences nor to grant import exemptions to educational institutions. It might be possible, however, to remove from the schedule articles which could not be produced in this country. He undertook to place the whole subject before the Minister of Education. In a leader in the *Times* of November 14 it is pertinently remarked, as evidence of the aloofness of the State from science, that "the interpellations on this scientific question were addressed to the Minister of Transport," who undertook to refer it, not to the Royal Society—"at one time the natural adviser of the Government on scientific matters"—but to the Minister of Education.

THE annual council meeting of the National Union of Scientific Workers was held at the University of London Club on November 12. The retiring president, Prof. L. Bairstow, in his address, referred to the friendships formed with kindred organisations as an indication of the solid progress the union had made in its development as an element in the life of the scientific community. While the union's aims were in part economic with immediate objects, the consideration of effects to be produced by a higher idealism had claimed the greater share of attention. The Royal Commission on Awards to Inventors provided a striking example of the contrast in methods of treatment between the independent worker and the salaried worker. In the statement it presented to the Interdepartmental Committee on Patents the union had suggested that the latter method was the proper basis of treatment for all. The union should now make preparations for the collection of material ready for the next occasion on which revision of the patent law occurs. Prof. Bairstow quoted from the Press reports of the preliminary findings of the "Geddes" Committee on Economy, which indicate that the War Research Departments were threatened by the "axe." This was folly, for the greatest economies depend on research and education. Everything depended on the interpretation of the word "research"; much of the money allocated to research was actually expended on technical development. Most scientific workers regard the war period as a lean time for scientific research while agreeing that it was one of intense application of science. Prof. Bairstow concluded by expressing the hope that scientific workers would seek for representation before Parliament by one of themselves. Dr. A. Griffith, of the Royal Aircraft Establishment, was elected president for the ensuing year, and Prof. J. Stanley Gardiner, of Cambridge, president of the research council.

THE Advisory Committee for the Meteorological Office, Edinburgh, met in Edinburgh on November 4, under the presidency of Dr. G. C. Simpson, Director of the Meteorological Office. This was the first meeting of the Committee since the completed organisation under the Air Ministry. The Committee is composed of representatives of the Fishery Board for Scotland, the Board of Agriculture, the Scottish Board of Health, the Scottish universities, the Royal Society of London, the Royal Society of Edinburgh, and the Royal Meteorological Society (with which the Scottish Meteorological Society is now amalgamated). Dr. Crichton Mitchell, the superintendent of the Edinburgh Meteorological Office, was also present. After paying a tribute to the memory of the late Dr. W. S. Bruce, the Director, in a brief historical statement, explained how the former relations between the Government and the Scottish Meteorological Society had gradually led to the establishment in Edinburgh of a Scottish branch of the Meteorological Office, by which the important voluntary work previously carried out by the society would henceforth be controlled. A description of the work now being developed was given, including an account of the observatories, telegraphic reporting stations, climatological stations, and rainfall stations. In the discussion which followed the applications of meteorology to fisheries, agriculture, and public health were considered, and various suggestions were made as to the possibility of closer and more fruitful co-operation between the Meteorological Office and these public bodies. Perhaps the most immediately practical point brought forward was the question of issuing a daily weather report in Edinburgh. A demonstration of this was carried out successfully during the recent meeting of the British Association.

MONTPELLIER, where the President of the French Republic, M. Millerand, has just unveiled a monument to the great satirist Rabelais, boasts one of the oldest universities. Its botanical gardens, in which the statue has been erected, is the oldest in France, and for more than two hundred years it has possessed an Academy of Sciences. On two occasions, in 1530 and in 1536, Rabelais was a student of medicine there, and to him was due the introduction into France of the melon, the artichoke, and the carnation. Though best known for his "Gargantua" and "Pantagruel," Rabelais, like his contemporary Paracelsus, was versed in all the learning of his day. The Montpellier Academy of Sciences was founded mainly through the efforts of the astronomers Plantade and de Clapies, and the inauguration took place on May 12, 1706, the day on which Plantade and de Clapies watched a total eclipse of the sun, the first eclipse of modern times of which the accounts are in any way full and precise. Plantade was a lawyer by profession, de Clapies a retired soldier and an engineer. Both were natives of Montpellier. De Clapies died in 1740, and the following year Plantade expired suddenly when making scientific observations on the Pic du Midi. Montpellier was also the home of Balard, who taught in the School of Pharmacy and, while botanising in the neighbouring salt marshes, studied the crystallisation of salts, which led him in 1826 to the discovery of bromine, for which our Royal Society awarded him a Royal medal. Soon after this Balard succeeded Thénard at Paris, and it was in his laboratory at the Ecole Normale that Pasteur, then his assistant, made his epoch-making discoveries in tartaric acid. Another eminent chemist connected with Montpellier was Gerhardt, who occupied the chair of chemistry from 1844 to 1848.

WE congratulate our contemporary, *The Electrician*, on the celebration of its diamond jubilee last week. During the past sixty years it has minutely recorded the growth of the numerous applications of electricity, and the record contained in its pages settles, both from the scientific and the technical point of view, many questions of priority. It is interesting to find that Faraday was one of its contributors. In 1862 he published a paper on "Electrical Illumination in Lighthouses." In 1861 telegraphy, the only practical application of electricity, was in private hands. The earliest telegraph was erected on the London and North-Western railway between Euston and Chalk Farm so far back as 1837 by Cooke and Wheatstone, but the lack of the means of making accurate measurements of the new quantities involved hampered progress. The important paper on "The Measurement of Electrical Quantities," published by Latimer Clarke and Sir Charles Bright in *The Electrician* for 1861 was a great step in advance. It is interesting to notice that these authors call the volt the "ohma," the ampere the "galvat," and the ohm the "volta." Fifty years ago submarine cables of more than 500 miles in length were worked in one direction only. The receiving instrument was a reflecting mirror galvanometer, the signals being read out by one operator and written down by another. The operators in those days were extremely skilful. From 125 to 150 letters per minute could be transmitted. For long distances the messages were sent in sections. For example, from Gibraltar to London the message had to be "man-handled" eight times. Nowadays automatic relays do the intermediate operations at far higher speeds, and a message can be sent automatically from London to Singapore.

MR. J. S. HIGHFIELD, in his presidential address to the Institution of Electrical Engineers on November 3, discussed the education of an engineer and various important financial problems concerning the future of the industry. He impressed on engineers the importance of giving their skilled assistants and their apprentices theoretical knowledge and opportunities for improving their manual skill. Manual skill can be acquired only from hand-skilled men. In his opinion there were no unskilled trades, but, unfortunately, there were many unskilled workmen. He considered that although trade unions had done good work they had done harm by forcing the principle of standard wages and by reducing output. All progress in industry depends on the ability of the individual or firm to give part of his "profits" to new ventures. It is only when profits are adequate that facilities can be given for education and research. At the present moment profits are not being earned by the great trading community in this country. Consequently many are wanting work, and many are in distress. It is necessary that masters should instruct their men as to the conditions that will ensure their mutual well-being. Much is being done to secure a common understanding. This will doubtless lead to a co-operation between masters and men such as has not been known for years. We can then go forward with the certainty that prosperity will return.

The next congress of the Royal Sanitary Institute will be held at Bournemouth on July 24–29, by invitation of the Mayor and Town Council.

The *Revue Scientifique* for October 22 contains an account of the celebration of the centenaries of the great Alsatian chemists Gerhardt and Wurtz, which took place at Strasbourg on July 5 last. An account of the work of Gerhardt and Wurtz is given by Prof. Tiffeneau, of Paris.

The issue of the Journal of the Society of Chemical Industry for October 31 contains a reasoned summary of the information which has appeared on the Oppau explosion. It is stated that many possible causes of the explosion were not taken into consideration in the report issued by the directors of the Badische company, and that an independent investigation by an expert Allied Commission is required.

The ninety-sixth Christmas course of juvenile lectures, founded at the Royal Institution in 1826 by Michael Faraday, will be delivered this year by Prof. J. A. Fleming on "Electric Waves and Wireless Telephony." The lectures, which will be experimentally illustrated, will be given on the following days at 3 o'clock:—December 29, "Surface Waves on Liquids"; December 31, "Waves in Air"; January 3, "The Telephone"; January 5, "Electric Oscillations"; January 7, "Electric Waves"; and January 10, "Wireless Telephony."

In addition to its ordinary programme, the Optical Society has arranged a series of special meetings to be devoted to subjects dealing with the evolution and development of various types of optical instruments. The Science Museum, Kensington, possesses a most interesting, and in many respects unique, collection of such instruments, with the characteristics of which instrument makers and users might well be more familiar. By arrangement with the museum authorities these instruments will be available at the meetings for purposes of illustration and demonstration. The first meeting of the series will be held at the Imperial College of Science and Technology on Thursday, November 24, at 7.30 p.m., when Prof. F. J. Cheshire will deal with "Polarising Apparatus." Other subjects to be discussed at future meetings include "Microscopes" (Prof. A. Pollard), "Telescopes" (Mr. D. Baxandall), and "Astronomical and Surveying Instruments" (Mr. L. C. Martin).

Although under the ban of the "Comstock Law," the scientific discussion of birth control is widely recognised in the United States as of great racial importance. Dr. Marie Stopes was invited by the Voluntary Parenthood League to New York to speak in the Town Hall on the subject on October 27. Following the lecture, which was enthusiastically received, a group of society leaders met the next day, subscribed sufficient funds, and organised a managing committee in order to open clinics immediately in America, following so far as possible the lines of the Constructive Birth Control Clinic founded by Dr. Marie Stopes and Mr. H. V. Roe in London this year. The position differs somewhat from that in England, for in the United States it is still legal to give clinical instruction only to persons already diseased. Those who are healthy and desire to remain healthy are not permitted this knowledge. It is, however, one step in racial advancement that the diseased should be shown how to avoid procreating their kind.

The Ministry of Transport has issued an informal memorandum which summarises some experimental work (done at Alresford, in Hampshire) on the effect of drainage from tar-macadam roads on fish-life. Recently-tarred roads are certainly potentially dangerous. The first rain-washings must be mixed with at least an equal volume of clean water if they are not to be actively toxic to fish. Even when the dilution is several times that mentioned the effects may be prejudicial, and to be sure that no poisoning may occur the dilution must be ten to one at least. After the first washings are swept away the surface becomes less objectionable. There is evidence that storage of the drained-off water reduces its toxicity to fish-life, and it appears also that filtration through freshly cut turf may also diminish the danger. When the tar-macadam surface undergoes further severe disintegration it may again become dangerous. The experiments are still incomplete and are being continued, but the provisional results are helpful to conservators and others, and point to remedial measures in the case of valuable fisheries.

A cold snap occurred in the weather over England during the second week of this month, and the first fall of snow for the present winter was experienced in London on the evening of November 11, whilst during the succeeding night at Greenwich the sheltered thermometer fell to 27° F., and it was 21° F. on the ground open to the sky. The mean temperature in London for the first six days of November was 49°, and for November 7–12 it was 15° colder. The ponds and ornamental waters around London were coated with ice. The first week of November is a fairly well recognised warm period in Great Britain, whilst the second week is one of Dr. Buchan's cold periods, associated with northerly winds. In 1910 November had sixteen frosty nights at Greenwich, and in the last eighty years there is only one other instance with so many, in the year 1851. In 1908 there was a short, but severe, early cold snap in November, the sheltered thermometer at Greenwich on November 10 registering 22° F., and on the grass the reading was 9° F. The coldest November at Greenwich occurred in 1871, when the mean temperature for the month was 38°. In 1890 a severe frost set in over England on November 25, the thermometer registering 18° F. in the shade on November 28, the lowest shade temperature on record for the month, and the maximum temperature for the day was only 27° F.; the frost continued practically without interruption until the end of February.

ON June 30 of this year the Manchester Museum celebrated its hundredth birthday, and in the November issue of the *Museums Journal* its keeper, Dr. W. M. Tattersall, takes occasion to give a brief history of the museum.

MR. W. BELLOWS, Tuffley Lawn, Gloucester, sends us the following extract from a letter received on November 9 from a correspondent in southern Manitoba (30 miles from the United States frontier):—"Perhaps you remember the little creek or river which runs through part of my land. A colony of beavers has built a house and dam, and, I fear, will flood my hay-land. I must apply to the Government for permission to break the dam. These creatures are increasing rapidly and will do much damage. They have now cut down a number of my trees of good size, and, if unmolested, will destroy all near. They are strictly protected; permission has to be obtained before one may be killed."

A DETAILED study of the races of Japanese domestic cattle, based on the examination of a large series of skulls, as well as on observations of the external morphology, forms the subject of a paper by Mr. Kenzo Iguchi in the Journal of the College of Agriculture, Hokkaido Imperial University, Sapporo, Japan (vol. 9, part 5). The author concludes that the domestic cattle of Japan are not native, but have been derived from the races of cattle of North China brought over by way of Chosen on the wave of migration which carried the ancient culture of China to Japan. Discussing the origin of Chinese cattle, Mr. Iguchi supports the view that they have been derived by an uninterrupted course of domestication from the zebu of northern India, which he regards as the ancestral wild parent of all the races of eastern Asiatic cattle.

THE conservation of the wild or native fauna of any part of the world will depend primarily upon economic considerations. The ideal of preventing, for scientific reasons, the extinction of wild species, because they *are* wild and represent the native fauna, will never be reached or even considered when commercial interests are at stake. It is from this aspect first and last that the problem is viewed. This is well instanced by the publication of two articles in the Yearbook of the United States Department of Agriculture, 1920, with the contradictory titles, "Conserving our Wild Animals and Birds," and "Hunting down Stock Killers." This apparent paradox is explained by the fact that the first article advocates increased measures for the protection of those animals and birds which are of commercial value, and the second details the work that has been done in the systematic destruction of the native Carnivores which take such enormous toll annually from the stock-farms and ranches of North America. The man of science and field naturalist will learn with satisfaction of the good results already discernible from the Migratory-bird Treaty Act of 1920. He can have nothing but admiration for the splendid work which the American Government has done in the preservation of bison, elk, antelope, and deer, and will welcome any measures which will save from extinction the small fur-bearing mammals of the Northern Territories. On the other hand, he will reflect that the Carnivores are at least a virile and dominant family which the most rigorous hunting may keep in check but hardly exterminate.

THE Hugo Müller lecture delivered before the Chemical Society on June 16 last by Prof. Benjamin Moore is printed in the October issue of the Journal. Prof. Moore spoke on "Photosynthetic Processes in the Air, upon the Land, and in the Sea in Relation to the Origin and Continuance of Life on the Earth." In dealing with this wide subject an attempt was made to trace the continuity of life from the inorganic world to the highest types of organism. Radiant energy from the sun is responsible for building up simple inorganic and organic compounds, including nitrogen compounds, from the air; the nitrogen of the atmosphere may be converted into proteins. Photosynthesis occurs not merely in the region of the absorption bands of chlorophyll, but throughout the spectrum, and the chlorophyll may be a colour-screen protecting the organism from the blue and ultra-violet rays, which are prejudicial to life. Prof. Moore describes many experiments in support of his novel and interesting views.

THE description of a new dye-printing photographic process is contributed by Dr. J. M. Eder to the *British Journal of Photography* for November 4. This method is distinct from Willis's aniline process (1864), Feer's diazotype (1889), Andresen's diazotype (1895), and the primuline process of Green, Cross, and Bevan (1890). It has been patented by the Badische Anilin- und Sodafabrik. Benzidine hydrochloride or other diamine compound is precipitated with an acid dye such as eosine, cyananthrol, Neptune-green, or quinoline-yellow, according to whether the print is to be a bright purplish-red, a dark violet, a bright green, or brown. The precipitate is mixed with manganese nitrate or a similar oxidiser and water, and coated upon paper. After exposure under a negative, fixing is done in a solution of borax or of sodium phosphate. So far pure whites have not been obtained, but the great brilliancy and variety of colour that are possible, and the good gradation and vigour of the prints, render the process, in Dr. Eder's opinion, worthy of attention.

SOME engineering uses of stainless steel, which is an alloy steel containing from 12 to 14 per cent. of chromium, are described in an illustrated article in

Engineering for October 28. The principal experiments described had for their object the determination of the suitability of the material for steam-turbine blades. In 1916 the British Thomson Co., of Rugby, fitted in one of their turbines an experimental wheel having blades of phosphor-bronze, nickel-bronze, brass, mild steel, and stainless steel. Of the four stainless steel blades inserted two were hardened and the other two were hardened and tempered. This turbine was at work from the autumn of 1916 until April, 1918, when it was opened out for the first time. All the blading was in good condition, but the stainless blades were the only ones entirely free from erosion or corrosion. The machine was put to work again and re-examined last July, when it was found that the stainless steel blades appeared to be absolutely unaffected by their service; further, the hardened and tempered blades were in as perfect condition as the hardened blades. All the other materials had suffered, some severely. Messrs. Firth and Sons fitted stainless blades 28 in. long into a turbine four or five years ago, and report that these also have given entire satisfaction. Other confirmatory experiments are described in the article. The subject is of very great importance in turbine manufacture, and it would appear from the tests that in turbine blading erosion and corrosion trouble can now be entirely eliminated.

The new catalogue (No. 364) of important and rare books on natural history, issued by Messrs. B. Quaritch, of 11, Grafton Street, W.1, contains nearly 800 titles. Interesting items we have noticed are two volumes of the "Index Kewensis" (1885–95), an edition, published in 1836–39, of Cuvier's "Basis of the Natural History of Animals," a Settin edition of Gilbert's "De Magnete," a copy of the first edition of Darwin's "Origin of Species," and the extensive collection of English and foreign pamphlets on Diatomaceæ, from the library of the late Wynne E. Baxter.

Messrs. Longmans and Co. have in the press a new book by Prof. A. W. Stewart entitled "Some Physico-Chemical Themes," which is intended to form a connecting link between systematic text-books of physical chemistry and the original literature of the subject. Among the subjects treated of will be double and complex salts, pseudo-acids and indicators, non-aqueous ionising media, colloids, the Brownian movement, absorption, catalysis, chemical affinity, emission spectra, the determination of Avogadro's constant, the periodic law, and atomic structure.

Our Astronomical Column.

Bright Assemblage of Morning Stars.—Mr. W. F. Denning writes: "During the remainder of the present month there will be visible before sunrise all the brightest planets, viz., Mercury, Venus, Mars, Jupiter, and Saturn, and in addition to these objects the crescent of the Moon will be visible in the south-eastern sky from about November 25–28.

"It is only at long intervals that so large a number of interesting planets occupy positions in the heavens enabling them to be viewed at the same time. Towards the end of the month Mars, Jupiter, and Saturn will be near one another, and they will be in conjunction with the Moon on November 25. Mercury and Venus will also be near together and low in the south-eastern sky, and on November 28 they may be seen near the narrow crescent of the moon. The best time at which to view these objects will be from about 6.30 to 7 a.m. Of the planets named Venus will appear to be much the brightest, while Jupiter will rank second."

Medieval Astronomical Instruments in India.—Memoirs of the Archæological Survey of India (No. 12) contains a description by G. R. Kaye of some medieval instruments of beautiful workmanship now in the Delhi Museum. There are three astrolabes belonging respectively to the thirteenth, fifteenth, and seventeenth centuries. They contain planispheres on which the principal stars are delineated with such accuracy that the date of construction can be ascertained within a few years by simple measurement of longitude. The stars' names are recorded in Arabic, and a glossary of their meanings is given in the memoir. It may be noted that the name Achernar (the last of the river) is applied to the third magnitude star θ Eridani, not to the bright star, 17° further south, that now bears it.

There are also tablets on the astrolabes giving the latitudes of several towns, and other details such as the length of the longest day.

The celestial sphere is of brass 6·5 cm. in diameter; it bears the date A.H. 1087 (or A.D. 1676). In spite of the small scale, the stars' positions are so accurate that their measured longitudes led to the date 1664.

It is of interest to note that the Arabs borrowed at least three constellation names—Thaur, Qantaurus, and Qitus—from the Greek, and that they call Betelgeux and Bellatrix the right and left shoulder of Orion; in other words, they take the figure as shown on a star-map, not on a globe, as some medieval European astrologers used to do.

Nova Aquilæ.—It is praiseworthy that of late years a number of observers have studied novæ on their decline, long after they have ceased to be spectacular. Comparison of their ultimate with their original condition is of value as likely to afford information as to the character of the event that produced the sudden outburst. Nova Aquilæ is a particularly favourable star to take for this purpose, as a long series of photographs of the star in its pre-nova state is available. It was then of about the 10th magnitude, but seemed to be irregularly visible to the extent of half a magnitude.

Popular Astronomy for October contains, in its Variable Star Report, numerous observations of the star made last summer. Each of the following values is the mean of about eight observations:—

1921, June 8, 9·44 mag.; July 1, 9·47 mag.; July 13, 9·64 mag.; July 28, 9·60 mag.; August 6, 9·47 mag. The observations leave it an open question whether there are short-period fluctuations; if such exist, their amplitude can scarcely exceed 0·2 mag. It will be seen that the star, in three years from the outburst, has declined to within some half-magnitude of its original brightness.